

Remarks

Reconsideration of this patent application is respectfully requested, particularly as herein amended.

Before turning to the merits of the Office Action of June 4, 2003, and although not required by the issued Office Action, a substitute specification has been submitted for this application. A marked-up copy of the original specification showing the changes which have been made in the substitute specification has also been enclosed, on separate pages, in accordance with the requirements of 37 C.F.R. §1.125(c). The substitute specification includes no new matter, and entry of the enclosed substitute specification is therefore respectfully requested in accordance with 37 C.F.R. §1.125(b).

Turning next to the merits of the Office Action of June 4, 2003, claim 1 has been rejected under 35 U.S.C. §102(b) as anticipated by U.S. Patent No. 5,938,440 (McSpadden). Claims 2 to 5 have been rejected under 35 U.S.C. §103(a) as being unpatentable over a proposed combination of PCT Publication No. WO 99/37235 (Farzin-Nia) in view of McSpadden, either alone or in combination with U.S. Patents to Buchanan (No. 5,752,825) and Garman (No. 6,299,445).

Applicant's original claims 1 to 5 have been canceled, and replaced with new claims 6 and 7, which have been drafted to better comply with the requirements of 35 U.S.C. §112, second paragraph. Claims 6 and 7 recite subject matter corresponding to

original claim 1, together with flutes which are formed in an "S" shape, corresponding to subject matter which was shown in the drawings originally submitted with this patent application. The specification has been correspondingly amended, at lines 17 and 18 of page 3 of the substitute specification submitted with this Reply, to provide a corresponding disclosure of such subject matter. It is submitted that such amendments leave moot the rejections of claims 2 to 5, which do not find counterparts in pending claims 6 and 7.

Applicant's claims 6 and 7 remain directed to a canal instrument, such as a dental reamer (claim 7), having a working cross-section which is defined by three flutes forming three cutting lips. In accordance with the present invention, the three cutting lips are located on the working cross-section at positions which correspond to the vertices of an isosceles triangle and the three flutes separating the three cutting lips have an "S" shape (claim 6).

McSpadden discloses endodontic instruments for performing root canals which have any of a variety of working cross-sections, which are shown in Figures 2 and 4B through 16B. None of these illustrations, however, would properly serve to show a structure forming the vertices of an isosceles triangle, as is recited in applicant's claims. At page 2 of the Office Action, it is indicated that "McSpadden shows a canal instrument having a cross section comprising three flutes 298, 300, 302, Fig. 14B, that are situated at the vertices of an isosceles triangle as shown." It is noted, however, that the flutes 298,

300, 302 shown in Figure 14B of McSpadden form a right triangle, having three different lengths, which would not constitute the illustration of an isosceles triangle (which would have two sides of equal length).

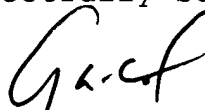
Moreover, while the flutes of the structures shown in Figures 2 and 4B through 16B of McSpadden have any of a variety of different shapes, none of the flutes illustrated has an "S" shape. It is also to be noted that of the various flutes shown in the cited PCT Publication (Farzin-Nia), noting Figures 2A to 2D and 3A to 3C, none of the flutes illustrated has an "S" shape.

Accordingly, it is submitted that applicant's claims are not anticipated by McSpadden, and that the teachings of McSpadden and the PCT Publication, even if combined, would not show the improvements called for in applicant's claims.

As a final matter, the drawings originally submitted in this matter have been objected to because the label "Prior Art" has not been applied to Fig. 1. In reply, a replacement sheet of drawings is enclosed, in accordance with the requirements of 37 C.F.R. §1.121(d), which bears Fig. 1 with the label "Prior Art".

Accordingly, it is submitted that the present application has been placed in condition for allowance and corresponding action is earnestly solicited.

Respectfully submitted,



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## BACKGROUND OF THE INVENTION

The present invention relates to the production of endodontic instruments for preparing dental canals, and more particularly, to a type of canal instrument which is known as a "dental reamer" and which has a working cross-section, called a "blade", which comprises three flutes forming three cutting lips.

Canal instruments which have a working cross-section comprised of three flutes forming three cutting lips are known in the art. In particular, this type of instrument is known from prior French Patent Applications No. 96 04987 and No. 96 14347.

012 The instruments described in these Patent Applications have a circular symmetry, on the order of three or more, depending on the number of cutting lips of the instrument. As a result, when the instrument is used (rotated) in a curved dental canal, the instrument follows the axis of the canal by virtue of the equilibrium of the forces applied to the instrument.

This type of instrument is satisfactory, except when the canal cannot be assimilated to a hole having a circular cross-section. This is because, in this latter case, the forces applied during preparation of the canal are no longer in equilibrium, and there is a risk that the trajectory of the instrument will deviate from the axis of the dental canal. This deviation can have very serious consequences since it can lead to the formation of an incorrect path, or even a perforation of the canal.

## SUMMARY OF THE INVENTION

It is the object of the present invention to remedy the disadvantages of prior dental reamers of this general type by providing an instrument having a blade which makes it possible to eliminate such risks.

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*Q2*  
This is achieved by deliberately breaking the circular symmetry of the instrument in such a way that, as the resistance of the blade to bending is no longer the same in all directions, the point of the instrument is made to seek out the dental canal and to naturally penetrate into the dental canal. To this end, the canal instrument of the present invention has a working cross-section which is comprised of three flutes, forming three cutting lips, and the three cutting lips are situated at the vertices of an isosceles triangle, rather than an equilateral triangle. The present invention also relates to different methods for producing the canal instrument of the present invention.

The present invention will be better understood from the following description of an illustrative embodiment, which is given as a non-limiting example, with reference to the following drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a cross-sectional view of a prior

canal instrument, having three cutting lips which are situated at the vertices of an equilateral triangle.

Figure 2 illustrates a cross-sectional view of a canal instrument of the present invention which is obtained by a first alternative method of production.

Figure 3 illustrates a cross-sectional view of a canal instrument of the present invention which is obtained by a second alternative method of production.

Figure 4 illustrates a cross-sectional view of a canal instrument of the present invention which is obtained by a third alternative method of production.

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#### DETAILED DESCRIPTION OF THE INVENTION

The canal instrument (1) of the present invention is a type of canal instrument which is generally known as a "dental reamer". The canal instrument (1) has a working cross-section (10) which comprises three flutes (20, 21, 22) forming three cutting lips (30, 31, 32). The three flutes (20, 21, 22) have an "S" shape. The three cutting lips (30, 31, 32) are situated at the vertices of an isosceles triangle.

Like all canal instruments of this type, the instrument of the present invention has a working cross-section (10), also referred to as the "blade", having an active part which is obtained by a cutting process and which has a conical shape (also obtained by a cutting process). The conical shape is

obtained, in most cases, by progressively moving a cutting wheel away from the axis of the instrument as one proceeds away from the point of the instrument.

Figure 1 shows a prior canal instrument (0), which is obtained by machining three identical flutes (20, 21, 22) forming three cutting lips (30, 31, 32) arranged at 120°.

The present invention also relates to different methods for producing the canal instrument (1).

Q2 Figure 2 illustrates a first possible method for producing the instrument (1) of the present invention. In this method, two flutes (20, 21) are produced by performing two identical, successive machining operations at 120°. A third flute (22) is then produced by performing a third machining operation at a greater depth than the first two machining operations.

It is also possible to make the depth of the third flute (22) greater than the depth of the first two flutes (20, 21) at the point of the working cross-section (10) of the instrument, which then becomes identical to the depth of the first two flutes (20, 21). The depth of the third flute (22) can become identical to the depth of the first two flutes (20, 21) either at the end of the working cross-section (10) or before the end of the working cross-section (10).

Figure 3 illustrates a second possible method for producing the instrument (1) of the present invention. In this method, two flutes (20, 21) are produced by performing two

identical, successive machining operations at an angle greater than  $120^\circ$ . The third flute (22) is then produced by performing a third machining operation which complements the first two machining operations.

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Figure 4 illustrates a third possible method for producing the instrument (1) of the present invention. In this method, two flutes (20, 21) are produced by performing two identical, successive machining operations at an angle less than  $120^\circ$ . The third flute (22) is then produced by performing a third machining operation which complements the first two machining operations.

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BACKGROUND OF THE INVENTION

The present invention relates to the ~~field of the~~ production of endodontic instruments for preparing dental canals, and more particularly, to a [[the]] type of canal instrument which is known as a instruments of the "dental reamer" and which has type ~~which have~~ a working cross-section, called a [[the]] "blade", which comprises three flutes forming three cutting lips.

Canal instruments which have a working cross-section comprised of ~~which comprises~~ three flutes forming three cutting lips are ~~already~~ known in the ~~prior art.~~

~~In art.~~ In particular, this type of instrument is known from ~~[[the]] prior [[art]]~~ French Patent Applications No. patent applications 96 04987 and No. 96 14347.

The instruments described in these aforementioned Patent Applications ~~patent applications~~ have a circular symmetry, on ~~[[of]]~~ the order of three or more, depending on the number of cutting lips of the ~~instrument.~~

Thus instrument. As a result, when the instrument is used (rotated) ~~in rotation~~ in a curved dental canal, the instrument follows the axis of the canal by virtue of the equilibrium of the

forces applied to the instrument.

This type of instrument is satisfactory, except when the canal cannot be assimilated to a hole having a ~~[[of]]~~ circular cross-section. This is because, ~~The reason is that~~ in this latter case, the forces applied during ~~[[the]]~~ preparation of the canal are no longer in equilibrium, ~~equilibrated~~ and there is a risk that the trajectory of the instrument will deviate ~~risks deviating~~ from the axis of the dental canal. This deviation can have very serious consequences since it can lead to the formation of an incorrect path, or even a perforation of the canal.

#### SUMMARY OF THE INVENTION

It is the object ~~canal.~~ ~~The aim~~ of the present invention ~~[[is]]~~ to remedy the disadvantages of ~~[[the]]~~ prior dental reamers of this general type ~~[[art]]~~ by providing ~~making~~ ~~available~~ an instrument having a ~~[[whose]]~~ blade which makes it possible to eliminate such risks.

This ~~this risk.~~ ~~This aim~~ is achieved by deliberately breaking the circular symmetry of the instrument in such a way that, as the resistance of the blade to bending is no longer the same in all directions, the point of the instrument is made to seek out the dental canal and to naturally penetrate into the dental canal. To this end, ~~latter naturally.~~

~~Thus,~~ the canal instrument of according to the present invention has a working cross-section which is comprised of ~~comprises~~ three flutes, forming three cutting lips, and ~~it is~~ characterized ~~in that~~ the three cutting lips are situated at the vertices of an isosceles triangle, rather than ~~[[not]]~~ an equilateral triangle. ~~The one, but an isosceles one.~~

The present invention also relates to different methods for producing ~~production of~~ the canal instrument of according to the present invention.

The present invention will be better understood from the following description of an illustrative embodiment, which is given as a non-limiting example, with reference ~~being made~~ to the following drawings. ~~attached figures, in which:~~

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a cross-sectional view of a prior canal instrument, having of the prior art, where the three cutting lips which are situated at the vertices of an equilateral triangle. ~~[[;]]~~

Figure 2 illustrates a cross-sectional view of a canal instrument of according to the present invention which is obtained by a first alternative method of production. ~~[[;]]~~

Figure 3 illustrates a cross-sectional view of a canal instrument of according to the present invention which is obtained by a second alternative method of production. [[; and]]

Figure 4 illustrates a cross-sectional view of a canal instrument of according to the present invention which is obtained by a third alternative method of production.

#### DETAILED DESCRIPTION OF THE INVENTION

The canal instrument (1) of according to the present invention is a type of canal instrument which is generally known as a [[of the]] "dental reamer". The canal instrument (1) has ~~type having~~ a working cross-section (10) which comprises three flutes (20, 21, 22) forming three cutting lips (30, 31, 32). The three flutes (20, 21, 22) have an "S" shape. The ~~It is characterized in that the~~ three cutting lips (30, 31, 32) are situated at the vertices of an isosceles triangle.

Like all canal instruments of this type, the instrument of ~~according to the present~~ invention has a working cross-section (10), also referred to as called the "blade", having an [[whose]] active part which is obtained by a cutting process and which has a conical shape (also obtained by a cutting process). The conical shape is obtained, in most cases, by progressively moving a [[the]] cutting wheel away from the axis of the instrument as

one proceeds away from the point of the instrument.

Figure 1 shows a prior [[A]] canal instrument (0), which is  
~~of the prior art,~~ obtained by machining three identical flutes  
(20, 21, 22) forming three cutting lips (30, 31, 32) arranged at  
120° [[,]] ~~is illustrated in Figure 1.~~

The present invention also relates to different methods for  
producing ~~production of~~ the canal instrument (1) ~~according to the~~  
~~invention.~~

Figure 2 illustrates a [[A]] first possible method for [[way  
of]] producing the instrument (1) of ~~according to~~ the present  
invention. In this method, ~~consists in producing~~ two flutes (20,  
21) are produced by performing two identical, successive  
machining operations at 120°. A [[,]] ~~then in producing the~~  
third flute (22) is then produced by performing a third machining  
operation at a greater depth than the first two machining  
operations [[,]] ~~as is illustrated in Figure 2.~~

It is also possible to make the depth of the third flute  
(22) ~~such that it is~~ greater than the depth [[that]] of the first  
two flutes (20, 21) at the point of the working cross-section  
(10) of the instrument, which [[and]] then becomes identical to  
the depth of the first two flutes (20, 21).

~~The 21).~~ The depth of the third flute (22) can become identical to the depth ~~[[that]]~~ of the first two flutes (20, 21) either at the end of the working cross-section (10) or before the end of the working cross-section (10).

Figure 3 illustrates a ~~[[A]]~~ second possible method for ~~[[way of]]~~ producing the instrument (1) of ~~according to~~ the present invention. In this method, ~~consists in producing~~ two flutes (20, 21) are produced by performing two identical, successive machining operations ~~[[,]]~~ at an angle greater than  $120^{\circ}$ . The ~~[[,]]~~ ~~then in producing the~~ third flute (22) is then produced by performing a third machining operation which complements ~~complementing~~ the first two machining operations ~~[[,]] as is illustrated in Figure 3.~~

Figure 4 illustrates a ~~[[A]]~~ third possible method for ~~[[way of]]~~ producing the instrument (1) of ~~according to~~ the present invention. In this method, ~~consists in producing~~ two flutes (20, 21) are produced by performing two identical, successive machining operations ~~[[,]]~~ at an angle less than  $120^{\circ}$ . The ~~[[,]]~~ ~~then in producing the~~ third flute (22) is then produced by performing a third machining operation which complements ~~complementing~~ the first two machining operations ~~[[,]] as is illustrated in Figure 4.~~